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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/760,443	01/20/2004	Larry S. Eoff	2001-IP-005267U1P1	9208
71/407 7590 ROBERT A. KENT P.O. BOX 1431 DUNCAN, OK 73536	04/03/2008		EXAMINER FIGUEROA, JOHN J	
			ART UNIT 1796	PAPER NUMBER
			NOTIFICATION DATE 04/03/2008	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/760,443

Applicant(s)

EOFF ET AL.

Examiner

John J. Figueroa

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 77-79, 81-87, 107-112, 187, 188, 190-196 and 198-220 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 77-79, 81-87, 107-112 and 187, 188, 190-196 and 198-220 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date October 26, 2007 & March 11, 2008
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Request for Continued Examination

1. Receipt is acknowledged on January 2, 2008 of a request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e) and a submission (amendment). The request has been deemed proper and this application has been hereby examined in view of said amendment.

Response to Amendment

2. The 35 U.S.C. 102(b) rejections as anticipated by United States Patent Number (USPN) 4,532,052 to Weaver et al. (hereinafter 'Weaver') and by USPN 3,271,307 to Dickson et al. (hereinafter 'Dickson') previously made of record in items 1 and 4 on page 2 of the Final Office Action mailed August 8, 2007 (hereinafter 'FOA') have been withdrawn in view of Applicant's amendment to the claims in the response to FOA submitted with the RCE filed January 2, 2008.

3. The 35 U.S.C. 103(a) rejection of claims 83, 86-88, 192 and 195-197 as unpatentable over Weaver in view of USPN 6,358,889 B2 to Waggenspack et al. (hereinafter 'Waggenspack') previously made of record in item 2 on page 2 of FOA has been withdrawn in view of Applicant's amendment to the claims in Response.

4. The potentially indicated allowable subject matter previously made of record in item 8 on page 4 of FOA has been withdrawn at this time in view of the new matter rejection presented below in this action.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 77-79, 81-87, 107-112, 187, 188, 190-196, 198-203 and new claims 204 and 205 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant has amended the claims to limit the recited hydrophobically-modified polymer to be "uncrosslinked". However, no support has been found in the present specification for the recited hydrophobically-modified polymers to be not crosslinked (that is, for the term "uncrosslinked").

Claim Rejections - 35 USC § 102

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. New claims 206-213 and 215-220 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent Number (USPN) 4,532,052 to Weaver et al. (hereinafter 'Weaver').

Examiner notes that these new claims do not limit the hydrophobically-modified polymer to be crosslinked but do require the backbone of the polymer to contain an oxygen, sulfur or phosphorous atom.

Weaver had been discussed in previous actions and grounds of rejection therein are included herein for Applicant's convenience.

Weaver discloses a method for fracturing or acidizing a subterranean formation to substantially alter the fluid flow (permeability) and/or surface characteristics of the formation, said method including injecting into the formation an aqueous composition that can alter the properties of organic/aqueous fluids, said composition containing a branched water-soluble organic polymer containing unit(s), having a molecular weight of 900 to 50,000,000, that can be hydrophilic, hydrophobic or a combination thereof, and can further include a gelling agent and/or a proppant. (Abstract; col. 5, lines 1-10 and 30-65; col. 6, lines 29-65; col. 7, lines 7-33; col. 9, lines 32-37 and 49-63; col. 20, line 65 to col. 21, line 6; col. 21, lines 49-63; col. 38, lines 37-51; col. 39, lines 24-36; *See also*, Table 6 on col. 53-54 disclosing data of aqueous fluid diverting and water permeability reduction properties for an aqueous fluid containing a methoxypolyethylene oxide branched polydimethylaminoethyl methacrylate copolymer, sand, silica flour and bentonite)

For example, an exemplary polymer disclosed in Weaver for treating subterranean oil producing formations has a cationic hydrophilic backbone modified with hydrophobic branches providing a desired hydrophobic-hydrophilic within the formation, thus altering the surface characteristic of the formation and the fluid flow or resistance to flow relative to a particular fluid, wherein the hydrophilic nature of the branched polymer serves as an aqueous gelling agent that provides for an increase in fluid viscosity. (Col. 5, lines 11-16; col. 6, line 65 to col. 7, line 40; col. 7, line 63 to col. 8, line 21; col. 10, lines 56-59; Table on col. 9-10) In Tables 23-28, Weaver discloses data for examples of treating a well by injecting into the well an aqueous solution containing a cationic polymer with nonionic branches.

The water-soluble branched polymer can have, in its backbone chain and/or in its branch chain, one or more heteroatom or groups, such as nitrogen, oxygen, phosphorous, sulfur, sulfur groups, amide, carboxyamide and carbonyl. (Col. 14, lines 17-23 and 52-59) The polymer units in either chain can be $-R-X-$, wherein R is a C_1 to C_8 alkyl radical and X represents a heteroatom and are preferably capped. (Col. 19, lines 36-65) Particularly, branched polymers containing polyamine and polyether linkages in the branches are preferred for altering fluid flow properties in the formation and are especially effective and stable at temperatures above $177^{\circ}C$. (Col. 13, lines 1-18)

Among the monomers disclosed in Weaver that can be used to form the branched polymer include dimethylaminoethyl methacrylate, acrylic esters, acrylamide, epichlorohydrin and chloroprene; wherein the polymeric unit/group can be derived from,

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e.g., saccharide or a derivative thereof (including cellulose and starch), vinyl, diallylic, amide or ether monomeric units, as long as it has the desired hydrophilic-hydrophobic property. (Col. 19, lines 7-10; col. 19, line 66 to col. 20, line 29; col. 22, lines 47-65)

The vinyl or diene polymer units are represented by (Class I, structure on col. 23); the amine type polymer units (Class III, structure on col. 24-25); the amide type polymer units (Class IV, structure on col. 25); whereas the saccharide and saccharide derivative units (Class V) are represented by the chemical structure depicted on col. 25-26, lines 43-59. (See also, the examples of class V on col. 35-36)

Weaver further discloses that a preferred class of polymers for altering aqueous fluid properties, such as altering water-oil ratio in a formation process and enhancing oil production, are polymers containing 2-hydroxypropyl N,N dialkyl-amine as backbone units and acrylamide (organic acid derivative) and/or epichlorohydrin reacted polyalkoxide as the branch units. (Col. 42, lines 31-37) In Procedure O beginning on col. 50, line 5, Weaver discloses an example of altering the permeability of a formation surface (change in water-oil ratio) by injecting into the formation a copolymer of polydimethylaminoethyl methacrylate (PDMAEM having MW of 1 million) grafted with a polyethylene oxide branch (PEO, MW of 15,000). The resulting data showing reduction in water permeability of the formation is shown in Tables 7 and 8. (See also Tables 10-13 on col. 57-59 for permeability data of an aqueous treating solution containing 1% of a hydrophilic PDMAEM polymer (MW of 600-800K) branched with a hydrophobic methoxy-polyethylene glycol epichlorohydrin (MPEO) adduct; particularly, polymer #7 of

Table 10). In Tables 14-15 on col. 59, Weaver further discloses PDMAEM:PEO/MPEO weight ratios for the branched polymer ranging from 0.5:1.0 to 1.25 to 0.25.

Finally, regarding the limitation in independent claims 77 and 187 concerning the hydrophobically modified water-soluble polymer reducing the permeability of the subterranean formation to an aqueous-based fluid, Weaver discloses results demonstrating reduction in water permeability in the same examples containing the modified polymer discussed above (immediately preceding paragraph) in Tables 10-13 and 14-14 on col. 57-60. (*See, e.g.*, Sample #7 on Table 10, showing a reduction in water permeability of 85%)

Thus, the claims are anticipated by Weaver.

Claim Rejections - 35 USC § 103

9. Claims 210, 213 and 214 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weaver in view of USPN 6,358,889 B2 to Waggenspack et al (hereinafter 'Waggenspack').

Weaver was discussed above. Weaver discloses the hydrophobic branch attached to the backbone of the hydrophilic polymer to contain an ester or amide. However Weaver does not specifically disclose the hydrophobic branch to be a succinic acid derivative.

On the other hand, Waggenspack teaches well drilling and servicing fluids that include an aqueous fluid containing a hydrophobically modified chitosan polymer (a glucosamine polysaccharide derivative), wherein said modified chitosan polymer is

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formed from the in-situ reaction of a chitosan polymer with an anhydride modifying compound, such as succinic anhydride, dodecynylsuccinic anhydride or any other alkenyl succinic anhydride having a C₂ to C₂₀ alkenyl chain. (Abstract; col. 3, line 65 to col. 4, line 6; col. 5, lines 33-65; col. 14, lines 48-67; Example 1)

Waggenspack further teaches that adding the modified chitosan water-soluble polymer increases the viscosity of the aqueous fracturing/servicing fluid, thus providing the fluid with enhanced low shear rate viscosity that is shear thinning. (Col. 1, lines 15-22 and 36-57; col. 3, lines 13-21)

Therefore, it would have been obvious to a person of ordinary skill in the art at the time that the invention was made to use the modified chitosan copolymer taught in Waggenspack as the hydrophobically modified hydrophilic polymer injected in Weaver's method of acidizing a subterranean formation. It would have been obvious for one skilled in the art to do so to attain a more cost-effective method of acidizing by using a more viscous aqueous fluid having superior shear properties as taught by Waggenspack, and thus efficiently attain a desired level of surface permeability of the subterranean formation.

Thus, the claims are unpatentable over Weaver and Waggenspack.

Response to Arguments

The 35 U.S.C. 102 Rejection over Weaver (item 1 of FOA)

9. Applicant's arguments presented in Response regarding the captioned 35 U.S.C. 102 rejection of claims 77-86, 88, 107-112, 187-195 and 197-203 as anticipated by

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Weaver have been fully considered and deemed persuasive in view of the amendment to the independent claims in Response limiting the molecular weight of the polymer and the hydrophobically-modified polymer to be not crosslinked.

Examiner notes that this new limitation in the amended claims that limits the polymer to be "linear" has been rejected, *supra*, under 35 U.S.C. 112, first paragraph, as containing new matter. If, in a subsequent amendment to these claims in response to this action, Applicant removes this limitation from the claims to overcome the aforementioned 35 U.S.C. 112, first paragraph, rejection, this rejection may be reinstituted (or a new rejection over Dickson and Weaver will be presented).

The 35 U.S.C. 102 Rejection over Dickson (item 4 of FOA)

10. Applicant's arguments presented in Response regarding the captioned 35 U.S.C. 102 rejection of claims 77-79, 81-88, 107-112, 187, 188 and 190-203 as anticipated by Dickson have been fully considered and deemed persuasive in view of the amendment to the independent claims limiting the molecular weight of the polymer. Dickson does not teach hydrophobically-modified polymers having a molecular weight within the range recited in independent claims 77 and 187.

The 35 U.S.C. 103(a) Rejection over Weaver and Waggenpack (item 8 of OA)

11. Applicant's arguments presented in the "Remarks" section of Response regarding the captioned 35 U.S.C. 103 rejection of claims 83, 86-88, 192 and 195-197 as unpatentable over Weaver in view of Waggenpack have been considered but

deemed moot in view of the withdrawal of this rejection in view of the amendment to the instant claims in Response.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John J. Figueroa whose telephone number is (571) 272-8916. The examiner can normally be reached on Monday-Thursday 8:00-6:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Randy Gulakowski/

Supervisory Patent Examiner, Art Unit 1796